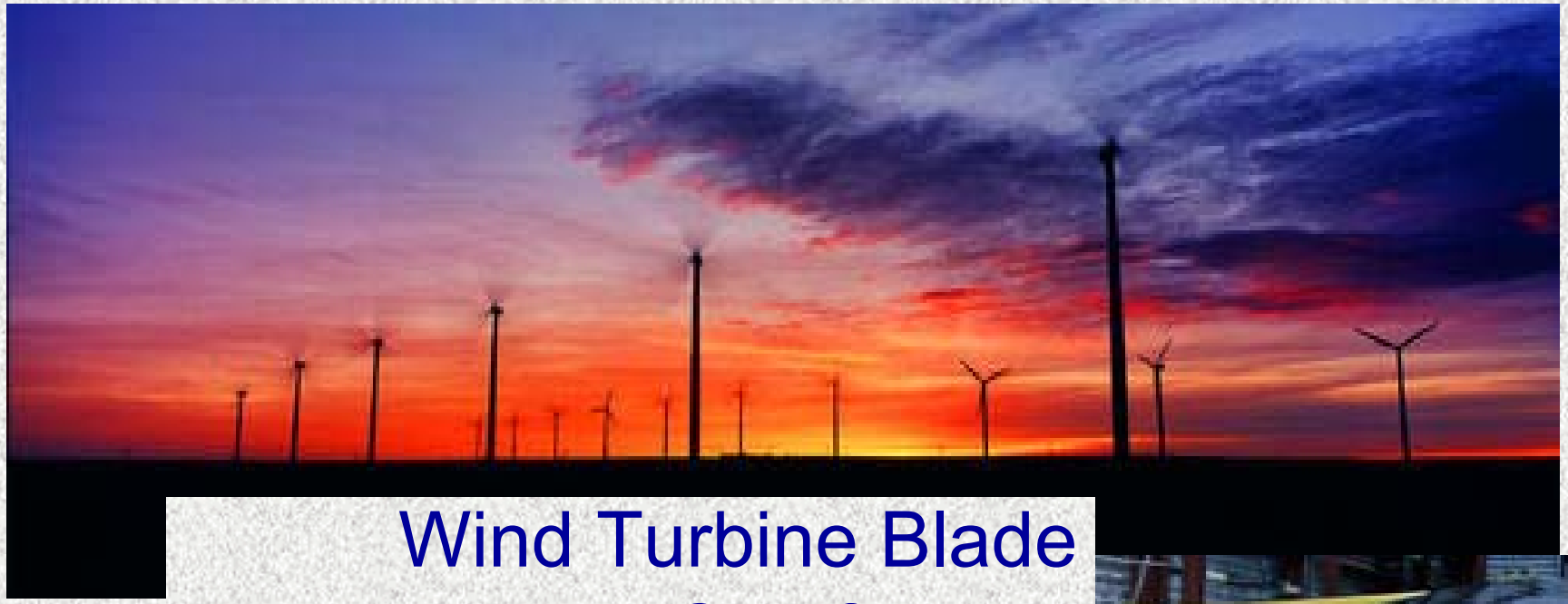
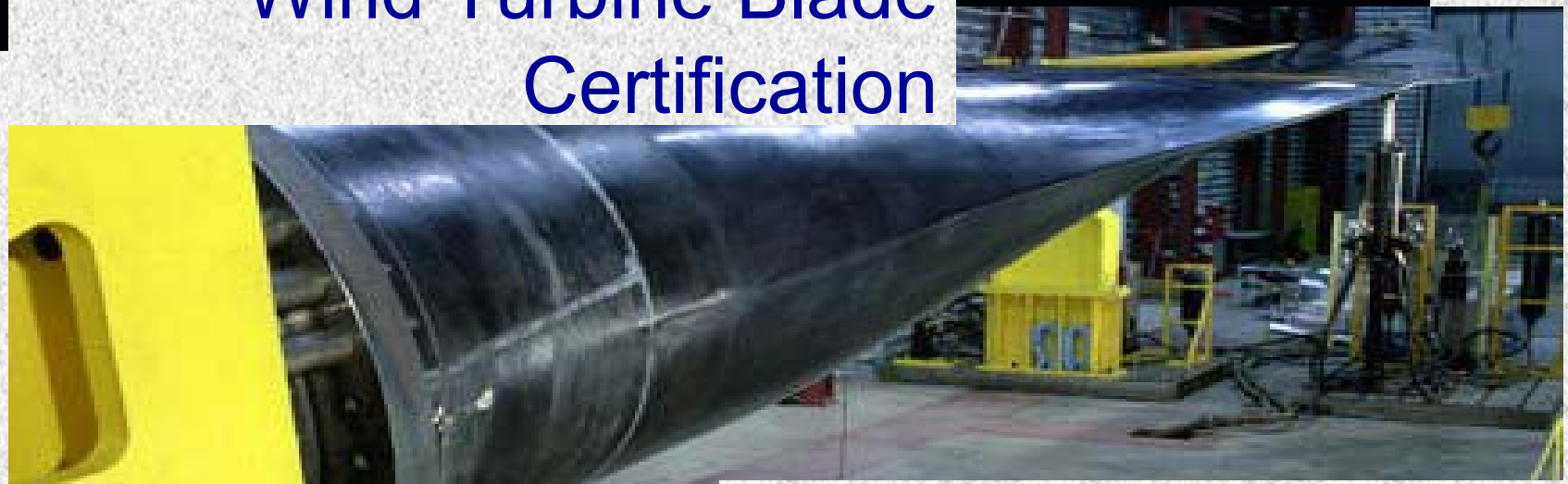


Wind Turbine Blade Certification



Bill Colavecchio
General Manager - Renewable Energy
February, 2004

Underwriters Laboratories Inc.®

Who we are

•Underwriters Laboratories Inc. (UL) is an independent, not-for-profit product-safety testing and certification organization. We have tested products for public safety for more than a century.

UL by the Numbers

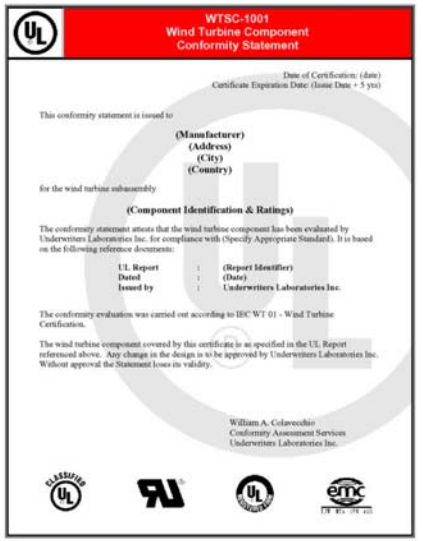
- In 2003:
- **19 billion** UL Marks appeared on products.
- **68,713** manufacturers produced UL-certified products.
- UL conducted **103,286** product evaluations.
- UL evaluated **18,850** types of products.
- UL conducted **547,708** follow-up visits in 2003 to audit compliance with product certification requirements.
- **127** UL inspection centers.
- UL customers were found in **99** countries.
- There were **876** UL Standards.
- UL registered **5,607** facilities to a management system standard as of Dec. 31, 2003.
- **60** laboratory, testing and certification facilities were part of the UL family of companies.
- More than **6,023** staff of the UL family of companies ready to serve UL customers.

What is Certification?

- IEC WT 01 defines Certification as:

  "Procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements, also know as conformity assessment"

- Key Points:
  - –Third Party
    - Capable and competent (IEC WT 01 Clause 9.1)
    - Accredited (IEC WT 01 Clause 9.2)
  - –Written Assurance
    - Certificate of Conformance
    - Design/Test Reports
  - –Specified Requirements
    - Currently dependent on the legal or market driver


WTSC-1001
Wind Turbine Component
Conformity Statement

Date of Certification: (date)
Certificate Expiration Date: (Issue Date + 5 yrs)

This conformity statement is issued to

(Manufacturer)
(Address)
(City)
(Country)

for the wind turbine subassembly

(Component Identification & Ratings)

The conformity statement attests that the wind turbine component has been evaluated by Underwriters Laboratories Inc. for compliance with (Specify Appropriate Standard). It is based on the following reference documents:

UL Report : (Report Identifier)
Dated : (Date)
Issued by : Underwriters Laboratories Inc.

The conformity evaluation was carried out according to IEC WT 01 - Wind Turbine Certification.

The wind turbine component covered by this certificate is as specified in the UL Report referenced above. Any change in the design is to be approved by Underwriters Laboratories Inc. Without approval the Statement loses its validity.

William A. Colavecchio
Conformity Assessment Services
Underwriters Laboratories Inc.

Who Drives WT Blade Certification?

- Legal Drivers
  - Federal, State or Local Governments
    - Bauordnungsrecht (Building Regulations Law) in Germany
  - Regulators and Local Authorities
    - Authorities Having Jurisdiction (Electrical & Building Inspectors)
- Market Drivers
  - Institutions and users that purchase or fund the purchase of wind turbines and wind turbine blades, but who do not have a legal jurisdiction to require certification
    - Turbine Manufacturers
    - Purchasers of Turbines
    - Financiers
    - Insurance Companies
- Alternatives/Additions to Market Driven Certification
  - Due Diligence

Required Segments of Blade Certification

- Component Certification per IEC WT 01 Requires:
  - –Design Evaluation
  - –Type Testing
  - –Manufacturing Evaluation
  - –Final Evaluation

What are the Testing requirements for Certification?

- IEC Standards for Large Wind Turbines
  - WT 01 & 61400-1
    - Full Scale structural testing required for every new type of blade
    - In general, Fatigue and Structural Tests are required
    - Other Blade Property Tests: Deflection, Stiffness Distribution, Natural Frequencies, Mode Shapes, Creep, etc.
    - IEC 61400-23 TS Ed. 1 provides guidance
- IEC Standards for Small Wind Turbines
  - WT 01 & 61400-2
    - Option to replace Full Scale structural testing with the Duration Test (currently 1500 hours of operation)
- Other Requirements
  - GL Blue Book

What is the Certification Process?

Applicant Designs Blade

Applicant & CB Negotiate Certification Project Scope

Applicant & CB Verify Design Assumptions via Design Evaluation

Applicant Provides Design Loads to Test Lab

Applicant Negotiates Design Verification Testing with CB and Test Lab

Test Lab Conducts Testing

Test Lab Issues Report

Applicant Submits Test Report to CB

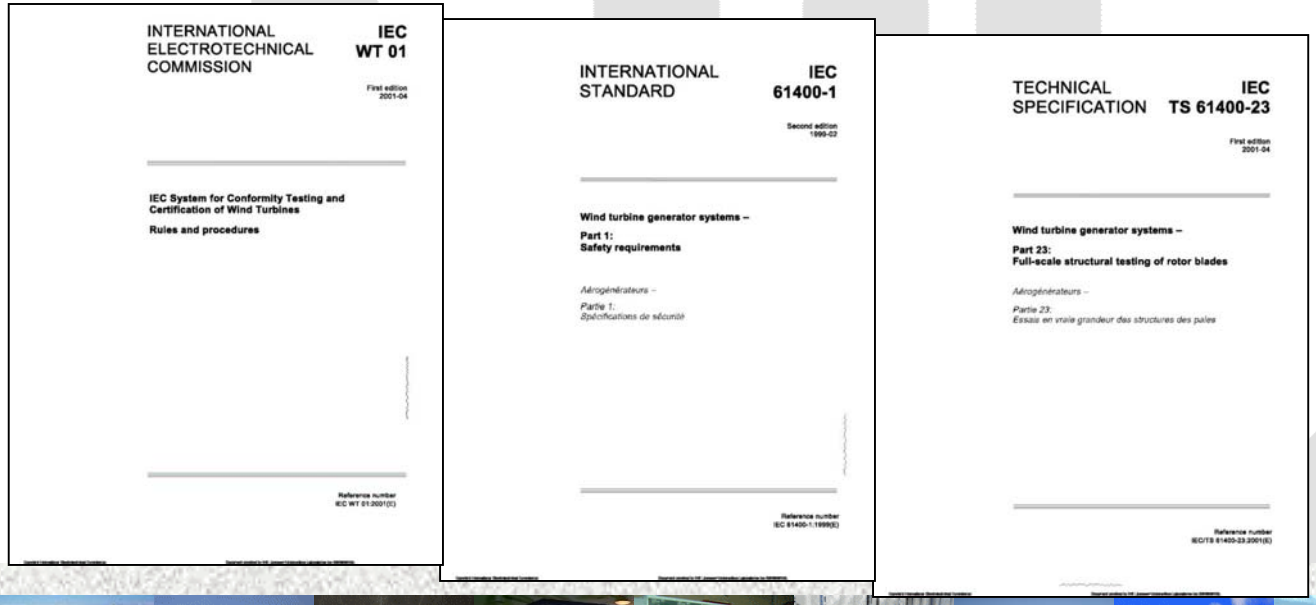
CB Verifies or Conducts Manufacturing Quality Assessment

CB Conducts Final Evaluation

CB Issues Type Certificate & Supporting Design & Testing Reports

What are the Benefits of Certification?

- Provides independent verification of compliance to a known benchmark
- Increased acceptance by key market drivers
- Complies with legal mandates where in effect
- Allows one-to-one comparison of performance when conducted to the same Standard



Keys for Successful WT Blade Certification?

- Understand your target market drivers
  - Legal vs. Market
  - Wind Turbine Manufacturer
  - Final Installation Site Drivers can dictate testing requirements to component manufacturers through mandates to the Wind Turbine Manufacturer
- Engage the Certification Body early into the design and testing process
  - Ensures that the Test Lab is acceptable to the Certification Body with respect to Accreditations, Contractual Agreements, etc.